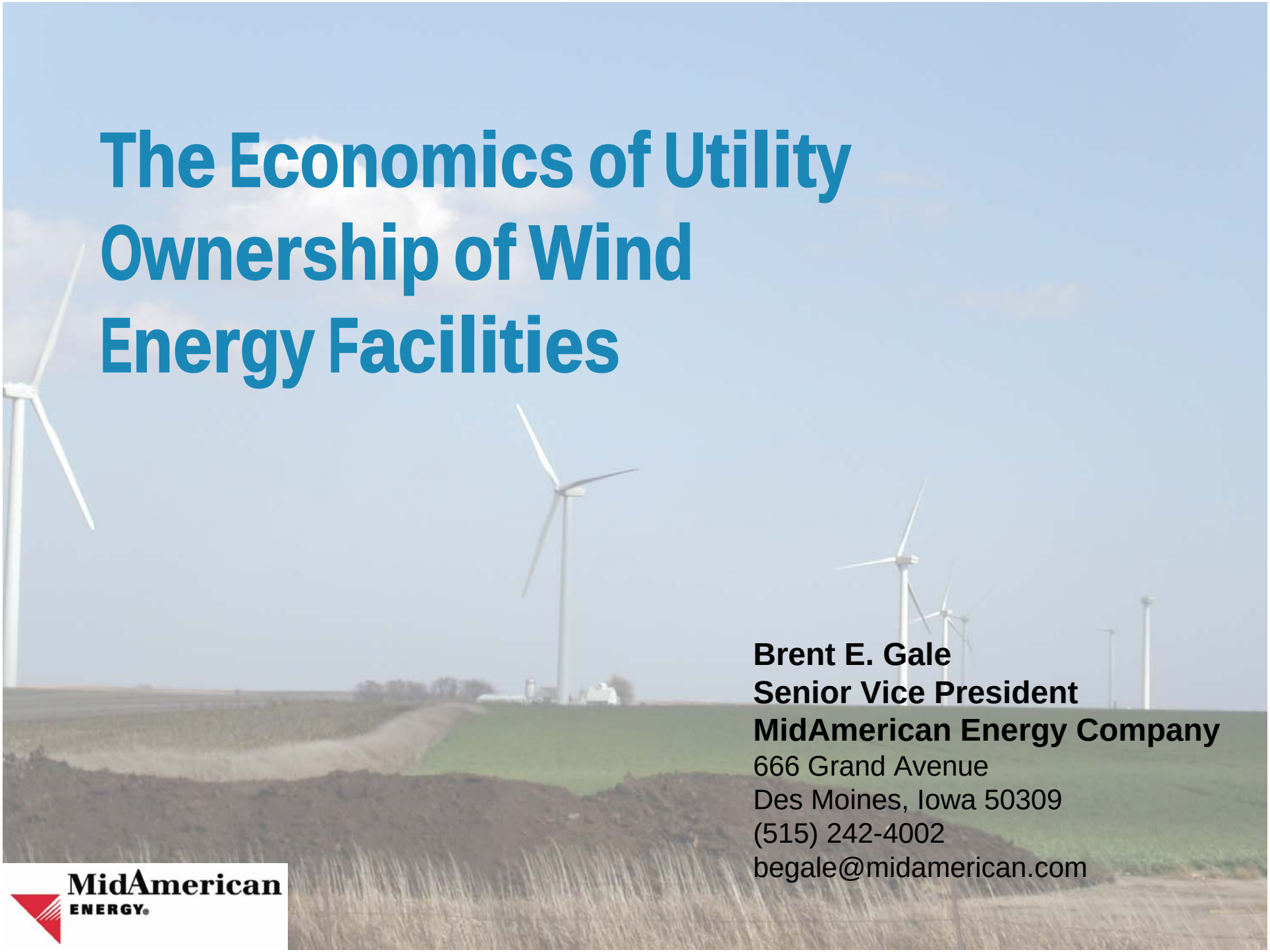
The Economics of Utility Ownership of Wind Energy Facilities



Brent E. Gale
Senior Vice President
MidAmerican Energy Company
666 Grand Avenue
Des Moines, Iowa 50309
(515) 242-4002
begale@midamerican.com

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MidAmerican Energy 2004-07 Fossil Generation Projects

- 540 MW combined-cycle gas generation plant (GDMEC) placed in service in 2004 in central Iowa
- 800 MW of super-critical, western-low-sulfur, coal-fired unit (CBEC – 4) under construction in western Iowa with completion in 2007; MidAmerican's share is 480 MW

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MidAmerican Energy 2004-05 Wind Generation Project Overview

- 360.5 MW of 1.0 to 1.5MW turbines on 25,000+ acres in northwest and north-central Iowa
- 65 meter towers – 70 meter rotors
- Primarily Class 4 wind resource with 34% capacity factor expected
- 160 MW placed in service in 2004 in northwest Iowa; remainder in north-central Iowa to be in service in 2005

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MidAmerican Energy 2004-05 Wind Generation Project Overview [continued]

- **37% - 40% capacity factor possible with 80 meter towers and 77 meter rotors, but customer economics less favorable based on 2004 costs**
- **Comparative 2005 turbine, tower and blade prices for longer blades and taller towers improve customer economics; but**
  - **Limited 2005 deliverability**
  - **Exchange rate risk**
  - **Higher prices**

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MidAmerican Energy Fuel Diversity – Nameplate Capacity

Type	2004			2008	
	MW	%		MW	%
Nuclear	785.0	14.4%		655.0	10.8%
Coal	2,870.9	52.7%		3,486.3	57.4%
Gas [1]	1,364.2	25.1%		1,364.2	22.5%
Oil [1]	70.0	1.3%		56.0	0.9%
Wind [2]	112.5	2.1%		473.0	7.8%
Hydro	4.5	0.1%		4.5	0.1%
Methane	11.5	0.2%		11.5	0.2%
Refuse	2.0	0.0%		-	-
Purchase [3]	224.7	4.1%		24.7	0.4%
Total [4]	5,445.3	100.0%		6,075.2	100.0%

[1] Included in gas fuel capacity is 380.8 MW of dual fuel capability. Oil is alternate fuel.

[2] The nameplate capacity for the wind is 112.5 MW. The proposed wind projects are 360.5 MW in nameplate capacity.

[3] Purchases include an unknown mix of fuel.

[4] Individual totals may differ due to rounding.

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MidAmerican Energy Fuel Diversity – Accredited Capacity

Type	2004			2008	
	MW	%		MW	%
Nuclear	816.9	14.7%		686.9 [1]	12.2%
Coal	2,868.9	51.6%		3,484.3	61.8%
Gas	1,537.0	27.7%		1,294.0	22.9%
Oil	70.0	1.3%		56.0	1.0%
Wind	20.5 [2]	0.4%		81.8 [3]	1.4%
Hydro	3.2	0.1%		3.2	0.1%
Methane	11.5	0.2%		11.5	0.2%
Refuse	2.0	0.0%		-	-
Purchase [4]	224.7	4.0%		24.7	0.4%
Total [5]	5,554.8	100.0%		5,642.4	100.0%

[1] Two of the nuclear units have been accredited above nameplate capacity.

[2] July 2004 accreditation for 112.5 MW of contracted wind power.

[3] Projected accreditation for 112.5 MW of contracted wind power and 360.5 MW of owned wind power.

[4] Purchases include an unknown mix of fuel.

[5] Individual totals may differ due to rounding.

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MidAmerican Energy Fuel Diversity – Energy

Type	2003			2008	
	GWh	%		GWh	%
Nuclear	6,145	21.5%		5,387	19.3%
Coal	18,595	65.1%		20,914	74.7%
Gas	287	1.0%		185	0.7%
Oil	2	0.0%		2	0.0%
Wind	283	1.0%		1,359	4.9%
Hydro	23	0.1%		26	0.1%
Methane	89	0.3%		86	0.3%
Refuse	0	0.0%		-	-
Purchase [1]	3,136	11.0%		20	0.1%
Total [2]	28,560	100.0%		27,979	100.0%

[1] Purchases include an unknown mix of fuel.

[2] Individual totals may differ due to rounding.

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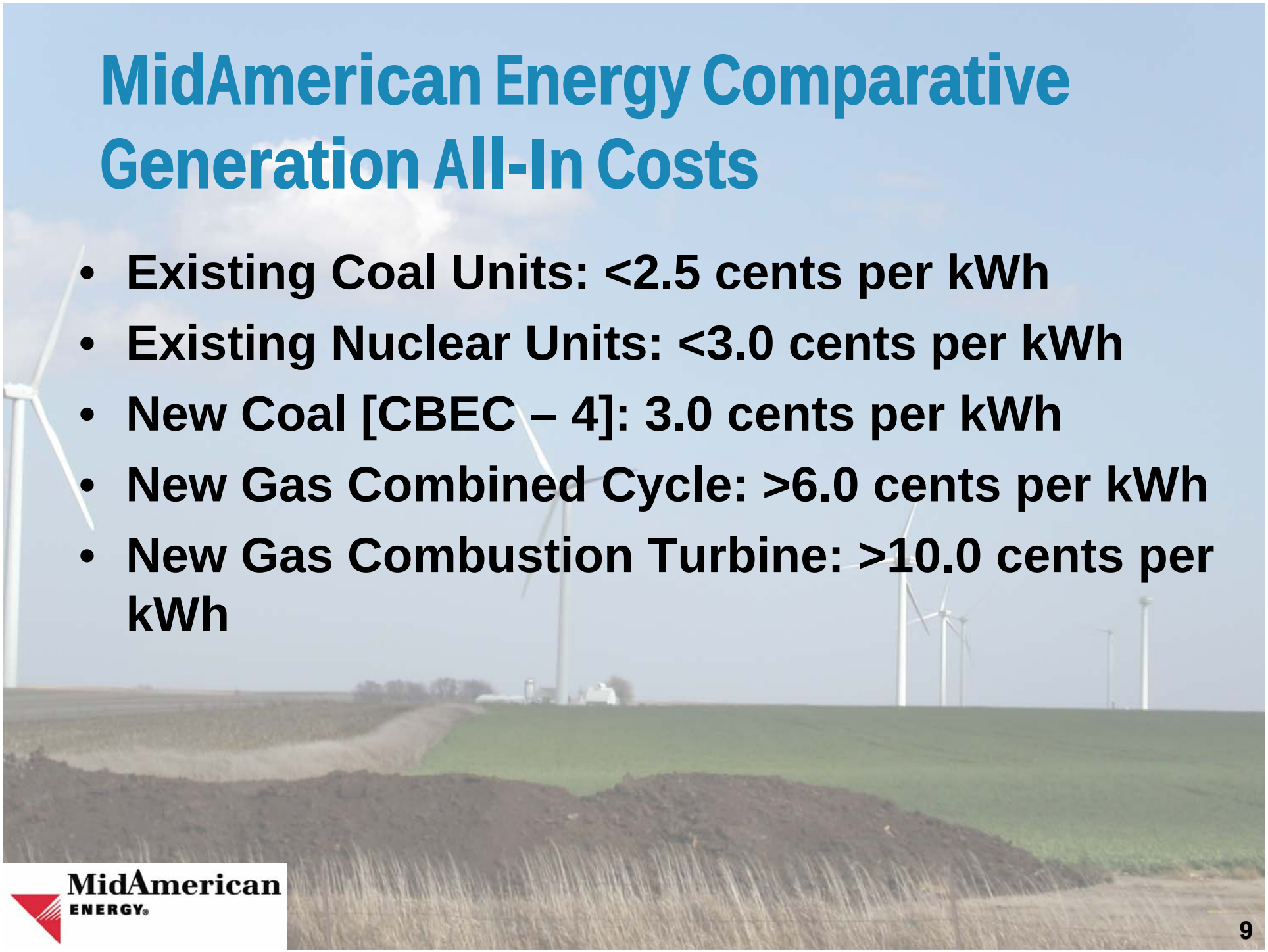
MidAmerican Energy Comparative Generation All-In Costs

- **Existing Coal Units: <2.5 cents per kWh**
- **Existing Nuclear Units: <3.0 cents per kWh**
- **New Coal [CBEC – 4]: 3.0 cents per kWh**
- **New Gas Combined Cycle: >6.0 cents per kWh**
- **New Gas Combustion Turbine: >10.0 cents per kWh**



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Wind Project Economics – 2004 All-In Cost per kWh Without Credits

Assumptions:

- **$1050/kW capital cost**
- **34% capacity factor**
- **50-50 capital structure**
- **7% debt cost; 12.2% equity return**
- **20-year depreciation life**
- **$25,000 annual O & M per MW**

20-year levelized cost per kWh = 5 cents

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Wind Project Economics With 2004 Federal Production Tax Credit

- **Wind Without Federal Production Tax Credit:**

  5.0 cents per kWh [1]

- **Wind With 2004 Inflation-Adjusted Federal Production Tax Credit:**

  3.0 cents per kWh [1]

[1] 2005 costs appear to be about 5.5 cents per kWh and 3.5 cents per kWh, respectively, using the same financing assumptions and 2005 turbine and tower costs.

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Caution

The foregoing costs do not include substation and transmission costs which can total millions of dollars.

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Wind's Place in the Portfolio

- **Wind is variable, largely non-dispatchable, and not reliable for serving Midwest peak conditions**
- **Wind supplements baseload generation; it is not a substitute for it**

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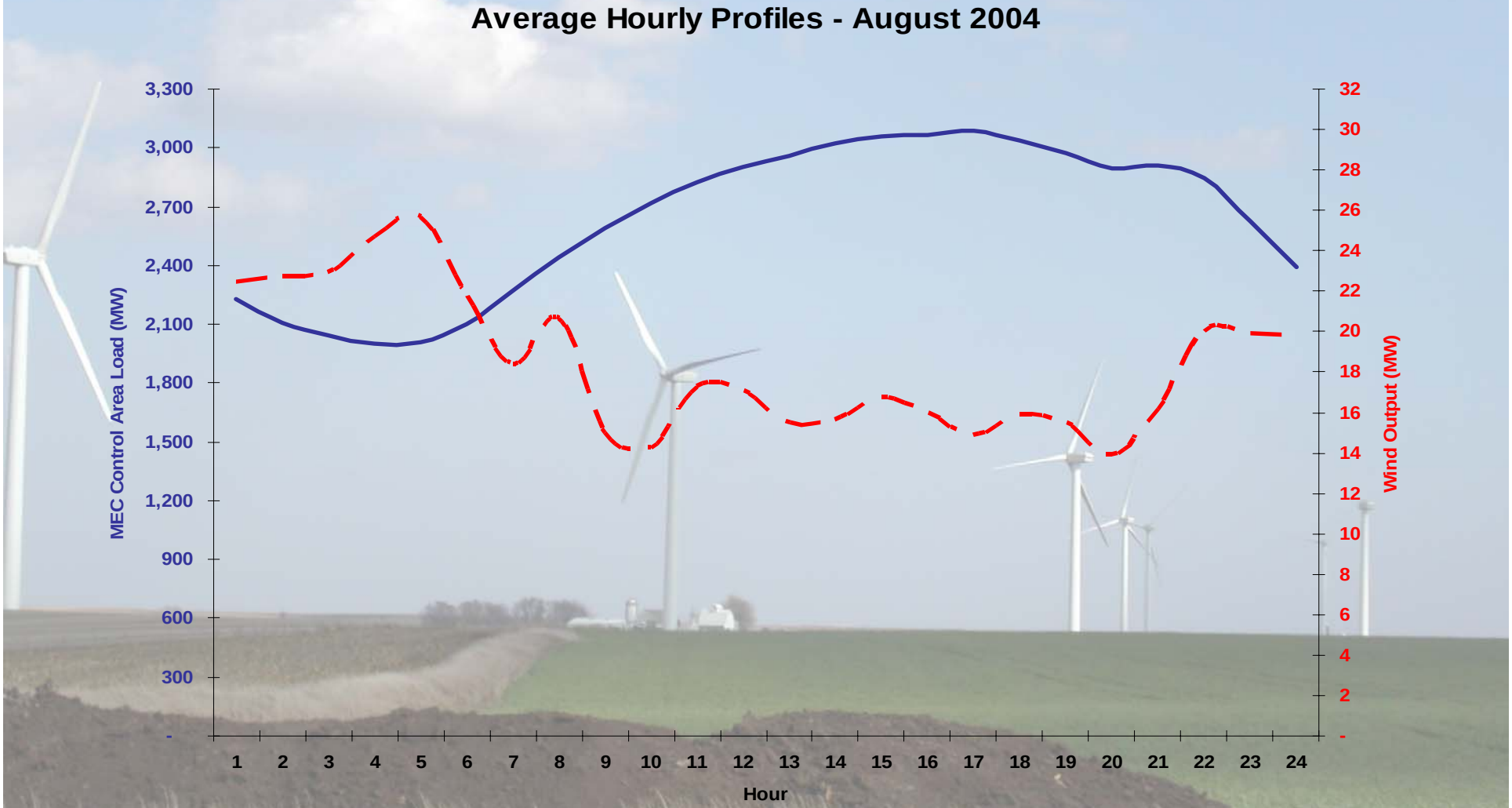
Summer Peak Month Coincidence



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Historical Annual Load/Output

Average Hourly Profiles: March 2004 - February 2005

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Offsets to the Variability and Non-Dispatchability of Wind Power- Benefits of Utility Ownership

Cash Flows

- **Federal Production Tax Credit**
- **Sale of Renewable Energy/CO2 Credits**
- **State Incentives**
- **Increased Wholesale Energy Sales**
- **Capacity Credit**
- **Federal Bonus Depreciation (2004)**

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Issues to Consider for the Wind Energy Power Purchase Alternative

- Debt leverage risk
- Developer counterparty business risk
- Operational/delivery risk
- Transmission risk
- Dispatchability/minimum load
- Class cost allocation
- Ownership of renewable and environmental credits

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Prerequisites for a Diverse Generation Portfolio

- **A clear statement of state energy policy; and**
- **Modification of state least-cost standards via:**
  - **Substitution of reasonable cost standard; or**
  - **Exception for renewables; or**
  - **Requirement to recognize externalities including the benefits of portfolio/fuel diversity**

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What Is Needed to Spur Development of Renewables?

- **Elimination of state barriers**
- **A national renewable credit trading program**
- **Continuation of the federal Production Tax Credit at some level until the credit trading market is robust**
- **State Renewable Production Standard mandates are NOT required and are counterproductive**

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QUESTIONS?

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